

REMARKS / ARGUMENTS

In response to the pending Office Action of November 6, 2009, Applicants provide the following arguments and amendments. The present amendments are requested solely for the purpose of more clearly describing and claiming the present invention. The present amendments do not introduce any new matter, and Applicants reserve the right to pursue the subject matter of the claims as originally presented. In light of the arguments presented and amendments requested, this application is in condition for allowance. Accordingly, entry of these amendments, reconsideration of all pending rejections and objections, and passage to allowance is respectfully requested. With the entry of this amendment, claims 1-14 are pending herein.

1. Amendments to the claims

Amendment of claim 1 is requested such that step (e) recites: "(e) exposing all electrodes, including the first set of coated electrodes, to a masking molecule to allow adsorption of the masking molecule onto all electrodes, including the first set of coated electrodes,". Support for the requested amendment can be found throughout the specification as filed. Specifically, support may be found in paragraph [0020]: "Step (e) is particularly important in the invention. This is a reprotection step in which adsorption of a masking molecule is allowed to take place onto all electrodes, including the electrodes provided with a layer of masking molecule and those onto which adsorption of the coating molecule has occurred." The requested amendment to claim 1 is provided to enhance clarity and particularly point out and distinctly claim certain aspects of the present invention. Amendment of claim 1 does not introduce any new matter.

2. Rejections of the claims

The invention of the pending claims provides electrochemical methods of coating individually-addressable electrodes with the advantageous combination of high purity and nanoscale resolution. In some embodiments for example, the methods provide for coating of closely spaced electrodes, for example electrodes separated by as little as 10

µm. Further, the methods of the present invention enable fabrication integrating large numbers of **highly pure** coatings of different coating molecules. Claim 1 has been amended to clarify and emphasize important aspects of the present invention, and now recites "(e) exposing all electrodes, including the first set of coated electrodes, to a masking molecule to allow adsorption of the masking molecule onto all electrodes, including the first set of coated electrodes."

a. Rejections under 35 U.S.C. § 103(a)

i. Rejection of claims 1-6, 10, 12, and 13

The Examiner has rejected claims 1-6, 10, 12, and 13 under 35 U.S.C. § 103(a) as being unpatentable over Tender *et al.* (*Electrochemical Patterning of the Self-Assembled Monolayers onto Microscopic Arrays of Gold Electrodes Fabricated by Laser Ablation*, Langmuir, 1996, 12, 5515-5518, herein after referred to as "Tender *et al.*"). In support of these rejections, the Examiner asserts that:

"Since Tender *et al.* recognizes that contamination of monolayers may occur on previously coated electrodes and that certain molecules function as a mask for adsorption, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have exposed the electrodes to a masking molecule, because it would minimize the displacement of monolayer constituents by the different alkanethiols in the solution, as suggested by Tender *et al.*"

Applicants respectfully disagree with the Examiner's characterization of Tender *et al.*, and request reconsideration and withdrawal of the present rejections under 35 U.S.C. § 103(a) in light of the present amendments and arguments.

First, Tender *et al.* is not fairly characterized as disclosing or teaching methods of producing highly pure electrode arrays employing a reprotection step. As the Examiner expressly acknowledges, "Tender *et al.* differs from the instant claims in that the reference does not explicitly teach providing a masking step between application of the first coating molecule and the second coating molecule." [Office Action of November 6, 2009, pg. 3]. Tender *et al.* is properly characterized, therefore, as deficient with respect to this important reprotection aspect of the present invention. In addition, because

Tender *et al.* does not teach a reprotection step [step (e)], it also does not teach steps which may follow a reprotection step, such as inducing electrochemical desorption of a masking molecule from the second set of electrodes [step (f)], or allowing a second coating molecule to adsorb onto the second set of exposed electrodes [step (g)]. Additionally, Applicants point out that the Examiner of the corresponding European Patent Office application [appl. no. 03756563.7, filed October 09, 2003] has accepted that Tender *et al.* does not disclose masking molecules, in the sense of masking molecules which form a masking layer on both electrodes and already coated electrodes. Although the Examiner has characterized Tender *et al.* as teaching that EG₆S and C₁₆S act as masking molecules, Applicants respectfully disagree with this characterization of Tender *et al.* In the context of Tender *et al.*, both EG₆S and C₁₆S appear to be referred to as forming a monolayer directly on an electrode. [See, e.g., Tender *et al.*, pg. 5517, first full paragraph]. Applicants submit, therefore, that both C₁₆S and EG₆S appear to be acting as coating molecules on different electrodes in Tender *et al.*, and that Tender *et al.* is more properly characterized as teaching the coating of bare electrodes without a masking or reprotection step. Additionally, it is not clear that C₁₆S or EG₆S are capable of acting as a mask for previously coated electrodes. Applicants assert, therefore, that it would not have been obvious to one of ordinary skill in the art at the time of the invention to include a reprotection step because Tender *et al.* does not suggest, or even contemplate, methods including a reprotection step.

Second, Tender *et al.* tends to teach away from use of a masking molecule in a reprotection step because Tender *et al.* teaches the problem of contamination can be solved in three ways, each of which being fundamentally different to the approach of the present invention. Specifically, Tender *et al.* teaches minimization of electrode contamination using low concentrations of alkanethiols, short immersion times, or analogous disulfides. [See, e.g., footnote 25, page 5517]. The methods of the rejected claims, in contrast, significantly reduce contamination in a fundamentally different way: by including a reprotection step between application of the first coating molecule and the second coating molecule. While Tender *et al.* does refer to extension of the

technique that "should be straightforward" and "should be possible" [see pg. 5517, last full paragraph], Tender *et al.* does not disclose how those objectives can be reached. Tender *et al.*, therefore, simply identifies the problem of contamination, but does not suggest, or even contemplate, a solution to this problem involving a masking step for reprotection. One skilled in the art at the time of the invention, therefore, would have been motivated to follow one of the methods of Tender *et al.* to reduce electrode contamination, as opposed to departing from this teaching by employing a fundamentally different technique, such as the addition of a reprotection step of the present invention.

Third, as noted above, the scope of the cited prior art is deficient with respect to key aspects of the present invention as claimed, and further, Applicants assert that this deficiency of the cited art extends well beyond a reasonably predictable variation of the individually addressable array fabrication techniques described in Tender *et al.* [See, Examination Guidelines for Determining Obviousness Under 35 U.S.C 103 in View of the Supreme Court decision in KSR International Co. V. Teleflex Inc., Fed. Register, Vol. 72, No. 195 (2007)]; "When considering obviousness of a combination of known elements, the operative question is whether the improvement is more than the predictable use of prior art elements according to their established functions"]. The invention of the rejected claims is not merely routine optimization of known methods of producing individually addressable arrays. Rather, the invention as claimed relates to a fundamentally distinct reprotection approach using a masking molecule to significantly reduce electrode contamination, a reprotection masking approach not even contemplated in Tender *et al.*

Tender *et al.* does not, therefore, render obvious claims 1-13 because it fails to disclose, teach or suggest all the limitations of the rejected claims as amended herein. The missing limitations, furthermore, were well outside the grasp of the skilled artisan at the time of the invention. Additionally, Tender *et al.* appears to teach away from the reprotection approach of addressing electrode contamination of the instant claims.

Accordingly, Applicants request reconsideration and withdrawal of the present rejections under 35 U.S.C § 103(a).

ii. Rejection of claims 7-9

The Examiner has rejected claims 7-9 under 35 U.S.C. § 103(a) as being unpatentable over Tender *et al.* in view of International Patent Application Publication No. WO/1999/51778 (herein after referred to as "Barton *et al.*"). In support of these rejections, the Examiner asserts that:

"It would have been obvious to one having ordinary skill in the art at the time the invention was made to have deposited the oligonucleotides of Barton *et al.* in the method of Tender *et al.*, because it would enable the electrodes to function as a biosensor for the detection of genetic mutations in the nucleic acid sequences."

Applicants respectfully disagree with the Examiner's characterization of Tender *et al.* and Barton *et al.*, and request reconsideration and withdrawal of the present rejections under 35 U.S.C. § 103(a) in light of the present amendments and arguments.

Applicants reiterate their arguments with respect to the rejection of claims 1-6, 10, 12, and 13 based upon Tender *et al.* Specifically, Applicants assert that Tender *et al.* does not teach or suggest a reprotection step and that one skilled in the art at the time of the invention would have been motivated to follow one of the methods of Tender *et al.* to reduce contamination, as opposed to departing from this teaching by employing a fundamentally different technique, such as the addition of a reprotection step. Likewise, the disclosure in Barton *et al.* is limited to detection of genetic point mutations in nucleic acid sequences employing a preexisting electrode or multi-electrode array and does not provide for methods of producing an individually addressable electrode array. Therefore, it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine Tender *et al.* and Barton *et al.* to arrive at the reprotection multi-electrode array production method of the present invention. Accordingly, reconsideration and withdrawal of the rejection of claims 7-9 is respectfully requested.

iii. Rejection of claim 11

The Examiner has rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Tender *et al.* in view of U.S. Pat. No. 6,355,420 (herein after referred to as "Chan"). In support of this rejection, the Examiner asserts that:

"It would have been obvious to one having ordinary skill in the art at the time the invention was made to have applied an electric field, as taught by Chan, in the method of Tender *et al.*, because it would align the coating molecules, such as DNA molecules or other polymers, in the direction of the electric field (column 85 lines 19-23 of Chan). The application of the electric field is either AC or DC, since an electrical potential for providing the electric field can only be applied by either AC or DC."

Applicants respectfully disagree with the Examiner's characterization of Tender *et al.* and Chan, and request reconsideration and withdrawal of the present rejections under 35 U.S.C. § 103(a) in light of the present amendments and arguments.

Applicants reiterate their arguments with respect to the rejection of claims 1-6, 10, 12, and 13 based upon Tender *et al.* Specifically, Applicants assert that Tender *et al.* does not teach or suggest a reprotection step and that one skilled in the art at the time of the invention would have been motivated to follow one of the methods of Tender *et al.* to reduce contamination, as opposed to departing from this teaching by employing a fundamentally different technique, such as the addition of a reprotection step. Likewise, the disclosure in Chan is limited to the orientation of polymers in an electric field and does not provide for methods of producing an individually addressable electrode array. Therefore, it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine Tender *et al.* and Chan to arrive at the reprotection multi-electrode array production method of the present invention. Accordingly, reconsideration and withdrawal of the rejection of claims 7-9 is respectfully requested.

CONCLUSION

In view of the foregoing arguments, this case is considered to be in condition for allowance and passage to issuance is respectfully requested. If new issues of

patentability are raised, the Examiner is invited to call and arrange for an opportunity to discuss these issues via telephone interview.

It is believed that a 2-month extension of time and corresponding fee of \$490.00 is required for this submission, pursuant to 37 C.F.R. §1.17(a)(3). A Request for Continuing Examination is submitted herewith and it is believed that a fee of \$810.00 pursuant to 37 C.F.R. §1.17(e) is required therewith. Therefore, payment in the amount of \$1,300.00 is being made via the Electronic Filing System with this submission. If this is incorrect or if any additional fees or further extensions of time are required, however, please deduct the appropriate fees required for this submission and any extension of time required from Deposit Account No. 07-1969.

Respectfully submitted,

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